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SUGHRUE MION, PLLC				
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EXAMINER				
SCHLENTZ, NATHAN W				
ART UNIT		PAPER NUMBER		
1616				
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11/27/2009		ELECTRONIC		

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary

Application No.

10/542,732

Applicant(s)

ONO, YASUHARU

Examiner

Nathan W. Schlientz

Art Unit

1616

Period for Reply -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 July 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,4-6,9-11 and 14-22 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,4-6,9-11 and 14-22 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB-06)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Status of Claims

Claims 1, 4-6, 9-11 and 14-22 are pending in this application and thus are examined herein on the merits for patentability. No claim is allowed at this time.

Withdrawn Rejections

Rejections and/or objections not reiterated from the previous Office Action are hereby withdrawn. The following rejections and/or objections are either reiterated or newly added. They constitute the complete set of rejections and/or objections presently being applied to the instant application.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1,148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

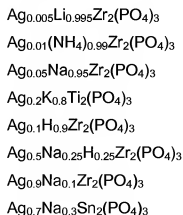
1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.

4. Considering objective evidence present in the application indicating obviousness or nonobviousness.
1. Claims 1, 4-6, 9-11 and 14-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Koji et al. (JP 07-304620; English-language translation provided herewith) in view of Wells et al. (US 4,356,280).

Determination of the scope and content of the prior art

(MPEP 2141.01)

Koji et al. teach an antimicrobial resin composition obtained by mixing at least one metal oxide, such as zinc oxide and titanium oxide, and a phosphoric acid quadrivalent metal salt-based antimicrobial agent represented by the following formula $Ag_aA_bM_2(PO_4)_3 \cdot nH_2O$, wherein A is an alkali metal, an alkaline metal, ammonium or hydrogen, M is a quadrivalent metal, $0 \leq n \leq 6$, with the proviso that $(a)+(mb)=1$ and m is valence of Al (Abstract). Koji et al. teach examples of the quadrivalent metal salt-based antimicrobial agent with the following formulas ([0015]).



Koji et al. further teach that the titanium dioxide is preferably anatase (i.e. anatase) or rutile with a particle diameter of 10 μm or less ([0010]), and that a calcium phosphate salt system antimicrobial agent had a particle diameter of 1.2 μm ([0037]). Koji et al.

also teach that the antimicrobial resin may be used in resin for fiber ([0026]). Also, Koji et al. teach an example wherein 36 parts $\text{Ag}_{0.44}\text{Na}_{0.26}\text{H}_{0.30}\text{Zr}_2(\text{PO}_4)_3$ was mixed with 64 parts titanium dioxide ([0044]).

Ascertainment of the difference between the prior art and the claims

(MPEP 2141.02)

Koji et al. do not teach that the size of the anatase titanium dioxide is smaller than the size of the phosphoric acid quadrivalent metal salt-based antimicrobial agent. However, Wells et al. teach that titanium dioxide is a particularly preferred additive in spinning highly viscous synthetic polymer fibers used to decrease the luster of the resulting fiber spun from the molten polymer (col. 1, ll. 12-31). Wells et al. further teach that anatase titanium dioxide is the preferred form because it is softer than rutile, thereby giving lower abrasiveness in yarn processing equipment, and the preferred average diameter is 0.1 to 0.5 μm , most preferably 0.2 μm or less (col. 3, ll. 1-16).

Finding of prima facie obviousness

Rational and Motivation (MPEP 2142-43)

Therefore, it would have been *prima facie* obvious for one skilled in the art at the time of the invention to prepare an antimicrobial composition comprising anatase titanium oxide and a phosphoric acid quadrivalent metal salt-based antimicrobial agent represented by the formula $\text{Ag}_a\text{A}_b\text{M}_2(\text{PO}_4)_3 \cdot n\text{H}_2\text{O}$ with a particle size of 1.2 μm , as taught by Koji et al., wherein the particle size of the anatase titanium dioxide is preferably 0.2 μm or less, as reasonably taught by Wells et al. One of ordinary skill in the art would have been motivated to use anatase titanium dioxide with a particle size of

0.1 to 0.5 μm , most preferably 0.2 μm or less, because Wells et al. teach that anatase titanium dioxide with a particle size of 0.1 to 0.5 μm , most preferably 0.2 μm or less is preferably used in the production of fibers because it is softer than rutile, thereby giving lower abrasiveness in yarn processing equipment.

From the teachings of the references, it is apparent that one of ordinary skill in the art would have had a reasonable expectation of success in producing the claimed invention. Therefore, the invention as a whole would have been prima facie obvious to one of ordinary skill in the art at the time the invention was made, as evidenced by the references, especially in the absence of evidence to the contrary.

Response to Arguments

Applicants argue on page 7 that the calcium phosphate salt system taught by Koji et al. do not correspond to the tetravalent metal phosphate system of the present invention, and Koji et al. do not teach or suggest anything about the average particle size of tetravalent metal phosphate-based antimicrobial particles. However, the examiner respectfully argues that Koji et al. teaches that an average particle size of 10 μm or smaller is preferable when taking into consideration dispersability in a resin ([0010]). Koji et al. further teach that undergoing a calcining process dramatically improves the chemical and physical stability of the antimicrobial agent, and a resin that is blended with the antimicrobial agent also achieves improved processability ([0021] and [0031]). However, calcining at too high a temperature could impair the antimicrobial property or could make it difficult to obtain a *fine-grained antimicrobial agent* ([0021]). Thus, Koji et al. clearly teach the desire for improved dispersability in a resin, improved

processability of a resin, and fine-grained antimicrobial agents. Further, Koji et al. teach that after silver-containing zirconium phosphate-based antimicrobial agents are calcined, they are pulverized to obtain the final antimicrobial agent; and this antimicrobial is mixed with the metal oxide in a small-size pulverizer ([0035] and Working Examples). Therefore, Koji et al. clearly provides motivation for obtaining fine-grained antimicrobial agents that are pulverized and provide sufficient processability and dispersability in a resin. Koji et al. also teach that an average particle size of 10 μm or smaller is preferable when taking into consideration dispersability in a resin. Therefore, one of ordinary skill in the art would be motivated to obtain an antimicrobial agent with an average particle size of 10 μm or smaller. Also, Koji et al. teach comparative reference examples wherein the antimicrobial agents have a particle size of 1.2 or 2.6 μm (Comparative Reference Example 1 and 2). Therefore, Koji et al. teaches comparative antimicrobial agents with a particle size of less than 10 μm . In order for these antimicrobial agents to qualify as comparative reference examples, the particle size of the inventive antimicrobial agents need to be similar to that of the comparative reference examples for stability, processability, and dispersability considerations. Therefore, one of ordinary skill in the art would formulate the tetravalent metal phosphate salt system (i.e., phosphoric acid zirconium salt system) having approximately the same particle size as the comparative reference examples (i.e., 1.2 or 2.6 μm).

Applicants also argue on page 8 that Koji et al. do not describe the relation of the particle size between the tetravalent metal phosphate-based particles and the inorganic

compound particles. Applicants argue that Wells et al. teach that anatase titanium dioxide is preferred because it is softer than rutile, and thus one of ordinary skill in the art would not be motivated to apply a powder material harder than the anatase titanium dioxide to the dispersion for incorporation with polyamide or polyester polymer. However, the examiner did not state that it would have been obvious to apply the antimicrobial agent of Koji et al. to the polyamide or polyester yarns of Wells et al. Koji et al. clearly teach a metal oxide, such as anatase or rutile titanium dioxide, in combination with a tetravalent metal phosphate-based antimicrobial agent. Koji et al. further teach that the metal oxide preferably has an average grain size of 10 micron or smaller for dispersability in a resin. Therefore, there is already a sufficient teaching by Koji et al. to combine anatase titanium dioxide of 10 μm or smaller with the tetravalent metal phosphate-based antimicrobial agent. Wells et al. is merely relied upon for the teaching that it would have been *prima facie* obvious to use anatase titanium dioxide with an average diameter of 0.1 to 0.5 μm , most preferably 0.2 μm or less. Wells et al. teach that anatase titanium dioxide is less abrasive than rutile in yarn processing equipment, and the average particle diameter is preferably 0.1 to 0.5 μm . Therefore, one of ordinary skill in the art would readily be able to determine the optimal particle size of the anatase titanium dioxide, and would be motivated to use an average particle diameter of 0.1 to 0.5 μm , which is taught by Wells et al.

Applicants further argue on page 10 that Example 4 and Comparative Example 4 of the instant specification demonstrate that by using an inorganic compound having an average particle size equal to or less than the average particle size of the tetravalent

metal phosphate-based antimicrobial particle, a superior and unexpected suppression of filament breakages results. However, the examiner respectfully argues that the example is not commensurate in scope with the instant claims. Example 4 specifically employs a 7:3 ratio of calcium carbonate and a tetravalent metal phosphate-based antimicrobial agent, both with an average particle size of 0.9 μm ; wherein the tetravalent metal phosphate-based antimicrobial agent is produced by adding $\text{NaZr}_2(\text{PO}_4) \cdot 1.1\text{H}_2\text{O}$ to nitric acid and silver ion, thus giving tetravalent metal phosphate-based antimicrobial agent particles with a silver content of 10 mass%. The claims are drawn to a composition comprising *any* tetravalent metal phosphate-based antimicrobial agent according to Formula (I), and *any* inorganic compound particles having a Mohs hardness of equal to or less than 6, wherein the average particle size of the inorganic compound particles is *smaller* than the average particle size of the tetravalent metal phosphate-based antimicrobial particles.

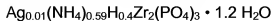
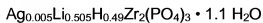
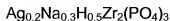
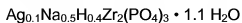
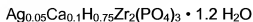
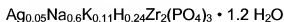
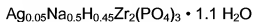
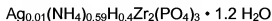
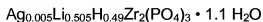
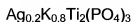
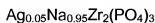
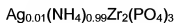
2. Claims 1, 4-6, 9-11 and 14-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hideki et al. (JP 10-265314; English-language translation provided herewith) in view of Wells et al. (US 4,356,280).

Determination of the scope and content of the prior art

(MPEP 2141.01)

Hideki et al. teach an antimicrobial agent composition obtained by including an antimicrobial powder represented by the formula $\text{M1}_a\text{A}_b\text{M2}_c(\text{PO}_4)_d \cdot n\text{H}_2\text{O}$ and a fluidity improving powder, such as alkaline earth metal salt powder, an amino acid-based

modifier or an alkaline earth metallic salt of a higher fatty acid; wherein M1 is at least one ion selected from silver, zinc tin, mercury, lead, iron, cobalt, nickel, manganese, arsenic, antimony, bismuth, barium, cadmium and chromium with the valence of (l), A is at least one ion selected from an alkali metal, an alkaline metal, ammonium or hydrogen with a valence of (m), M2 is a tetravalent metal, $0 \leq n \leq 6$, (a) and (b) are each a positive number, (c) is 2 and (d) is 3 when $(la) + (mb) = 1$ (Abstract), and is suitable for use in a fiber ([0001]). Hideki et al. further teach that M1 is preferably silver because mildew-proofing, antibacterial properties, and seaweed-proofing nature can also be raised while it is excellent in safety ([0007]); A is preferably lithium ion, sodium ion, a hydrogen ion or ammonium ion ([0008]); and M2 is preferably zirconium and titanium ([0008]). Hideki et al. teach several examples of the following formulas ([0009])



Hideki et al. also teach that the fluidity improving powder includes calcium carbonate, magnesium carbonate, magnesium stearate, magnesium oleate, oleic acid calcium, alumina, aluminum hydroxide, potassium aluminum sulfate, MgO, calcium phosphate, talc, titanium oxide, colloidal silica, aluminum silicate hydrate, etc. ([0012]). Also, Hideki et al. teach that the fluidity improving powder is present at 5 to 200 wt. parts to 100 wt. parts of antibacterial powder ([0012]). Furthermore, Hideki et al. teach an example wherein the antimicrobial powder has a mean particle diameter of 0.9 μm or 1.3 μm , and the fluidity improving powder, calcium-carbonate powder, has a mean particle diameter of 9.7 μm ([0017] and [0018]).

Ascertainment of the difference between the prior art and the claims

(MPEP 2141.02)

Hideki et al. do not teach that the titanium dioxide is anatase titanium dioxide and that the mean particle size of the titanium dioxide is less than the mean particle size of the antimicrobial powder. However, Wells et al. teach that titanium dioxide is a particularly preferred additive in spinning highly viscous synthetic polymer fibers used to decrease the luster of the resulting fiber spun from the molten polymer (col. 1, ll. 12-31). Wells et al. further teach that anatase titanium dioxide is the preferred form because it is softer than rutile, thereby giving lower abrasiveness in yarn processing equipment, and the preferred average diameter is 0.1 to 0.5 μm , most preferably 0.2 μm or less (col. 3, ll. 1-16).

Finding of *prima facie* obviousness

Rational and Motivation (MPEP 2142-43)

Therefore, it would have been *prima facie* obvious for one skilled in the art at the time of the invention to prepare an antimicrobial agent composition obtained by including an antimicrobial powder with a mean particle diameter of 0.9 μm or 1.3 μm represented by the formula $\text{M1}_a\text{A}_b\text{M2}_c(\text{PO}_4)_d \cdot n\text{H}_2\text{O}$ and a fluidity improving powder, such as titanium dioxide, as reasonably taught by Hideki et al., and use anatase titanium dioxide with an average particle size of 0.1 to 0.5 μm , most preferably 0.2 μm or less, as reasonably taught by Wells et al. One of ordinary skill in the art would have been motivated to use anatase titanium dioxide with a particle size of 0.1 to 0.5 μm , most preferably 0.2 μm or less, because Wells et al. teach that anatase titanium dioxide with a particle size of 0.1 to 0.5 μm , most preferably 0.2 μm or less is preferably used in the production of fibers because it is softer than rutile, thereby giving lower abrasiveness in yarn processing equipment.

From the teachings of the references, it is apparent that one of ordinary skill in the art would have had a reasonable expectation of success in producing the claimed invention. Therefore, the invention as a whole would have been *prima facie* obvious to one of ordinary skill in the art at the time the invention was made, as evidenced by the references, especially in the absence of evidence to the contrary.

Response to Arguments

Applicants argue on page 12 that Hideki et al. uses an inorganic compound having an average particle size that is larger than that of the tetravalent metal phosphate-based antimicrobial agent of the present invention. Applicants further argue that Wells et al. teach that anatase titanium dioxide is preferred because it is softer than

rutile, and thus one of ordinary skill in the art would not be motivated to apply a powder material harder than the anatase titanium dioxide to the dispersion for incorporation with polyamide or polyester polymer. However, the examiner did not state that it would have been obvious to apply the antimicrobial agent of Hideki et al. to the polyamide or polyester yarns of Wells et al. Hideki et al. teach that the fluidity improving powder includes titanium oxide. Wells et al. is relied upon for the teaching that it would have been prima facie obvious to use anatase titanium dioxide with an average diameter of 0.1 to 0.5 μm , most preferably 0.2 μm or less, in the compositions of Hideki et al. Wells et al. teach that anatase titanium dioxide is less abrasive than rutile in yarn processing equipment, and the average particle diameter is preferably 0.1 to 0.5 μm . Therefore, one of ordinary skill in the art would readily be able to determine the optimal particle size of the anatase titanium dioxide, and would be motivated to use an average particle diameter of 0.1 to 0.5 μm , which is taught by Wells et al.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not

mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nathan W. Schlientz whose telephone number is (571)272-9924. The examiner can normally be reached on 9:00 AM to 5:30 PM, Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Johann R. Richter can be reached on 571-272-0646. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

NWS

/John Pak/
Primary Examiner, Art Unit 1616